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Original Article

Study of correlation between intraoperative crush smears, frozen section diagnosis and biopsy results of intracranial lesions

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Abstract

Crush cytology and frozen sections of intracranial space occupying lesions (ICSOLs) are an effective and time saving tool for intra operative consultation. In a stereotactic biopsy, it enables the pathologist to rightly comment whether (a) brain tissue is there or not in the biopsy, (b) possible nature of the lesion. In a resection for an ICSOL, the techniques help the surgeon with an intra operative working diagnosis.

Keywords: Crush cytology; Frozen section; Biopsy

1. Introduction

Crush cytology and frozen sections of intracranial space occupying lesions (ICSOLs) are an effective and time saving tool for intra operative consultation. In a stereotactic biopsy, it enables the pathologist to rightly comment whether (a) brain tissue is there or not in the biopsy, (b) possible nature of the lesion. In a resection for an ICSOL, the techniques help the surgeon with an intra operative working diagnosis.

The present study attempts to validate the diagnostic accuracy of the two methods with histopathological diagnosis as the Gold standard. Similar studies have been carried out in India recently, notably from a group in Jammu who attained a crush smear diagnostic accuracy of 95.36% in a series of 151 cases[1].

In another series of 114 cases, diagnostic accuracy of crush crush smear was found to be 88.5% (85/96) and the accuracy on FS diagnosis was 90.6% (87/96), with 84.9% in the group of glial tumors[2]. A similar diagnostic accuracy was achieved in a series of 183 tumors, where crush smears yielded the right diagnosis in 89.7% (140/156). The accuracy of FS diagnosis was 90.4%[3].

2. Method

Over a period of one year, all intrcranial lesions which were sent for biopsy were studied, along with respective frozen sections and crush smears. A standardised format for collection of data was used. Crush smears were classified as (a) Fibrillary (b) Difficult to spread (c) Liquid (d) Granular. Similarly, the various diagnoses given on frozen section were stratified as (a) Low grade astrocytoma, (b) High grade astrocytoma, (c) Meningeal, (d) Metastatic, (e) Non specific/ gliosis. The correlation between various diagnostic groups and the final biopsy diagonosis was analysed by standard statistical methods.

2.1 Type of intracranial lesions

A total of 55 cases were studied. Various grades of astrocytoma constituted the bulk of the lesions (33 in number, 60%). Grade IV astrocytoma was the commonest lesion (41.8% of all lesions, 69.6% among astrocytomas). Meningiomas were the second most common tumor (12.7%).

Table 1: Type of intracranial lesions

	Astro-cytoma	Menin-gioma	Oligodendroglioma	Other intracranial*	Gliosis/ non specific	Metastatic	Central neuro-cytoma
Grade 1		7	1	5	4	3	
Grade 2	5						
Grade 3	5						2
Grade 4	23						
Total	33	7	1	5	4	3	2

* Including pituitary macroadenoma – 1, craniopharyngeoma – 1, schwannoma – 1, cerebellar hemangioblastoma – 1, tuberculosis – 1

3. Result and Discussion

Table 2: Correlation of crush cytology and histopath

	Diagnosis on biopsy						
Pattern on crush smear	Astrocytoma	Meningioma	Oligodendroglioma	Other intracranial	Gliosis/ Nonspecific	Metastatic	Neurocytoma
Fibrillary	29	2	1		3		1
Difficult to spread	2	2		01 (Schwannoma)	1		
Liquid	1			02 (TB, pituitary macro-adenoma)		2	1
Granular	1	3		02 (Cranio-pharyngeoma, hemangioblastoma)		1	
Total	33	7	1	5	4	3	2

Table 3: Accuracy of fibrillary pattern on crush smear in diagnosing astrocytomas

	Astrocytoma	Others
Fibrillary	29	07
Not fibrillary	4	15

Chi square = 18.35, p = 0.00001841

Diagnostic acuracy = 83.33%

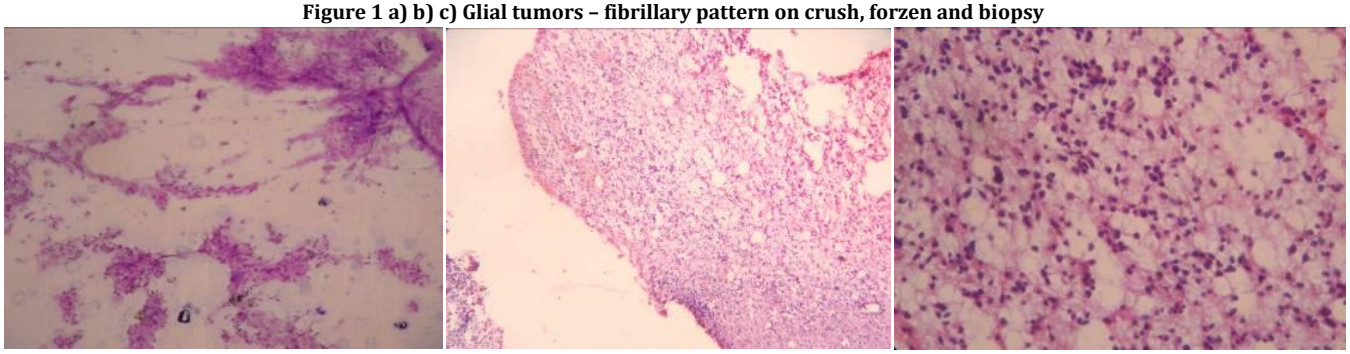
Table 4: Correlation of frozen section and histopath

	Diagnosis on biopsy							
Pattern on frozen section	Astrocytoma (low grade)	Astrocytoma (high grade)	Meningioma	Oligodendroglioma	Other intracranial	Gliosis/ nonspecific	Metastatic	Neurocytoma
Low grade glial	4	1	3	1		1		1
High grade glial	1	26			1		1	
Meningeal		1	3					
Non specific			1		3	3		1
Metastatic					1		2	
Total	33		7	1	5	4	3	2

The frozen section was seen to be highly accurate in separating glial from other lesions (p = 0.0009). It was also highly accurate in predicting whether the astrocytoma was low grade (WHO I, II) or high grade (WHO III, IV) (p = 0.000015). Overal diagnostic concordance of frozen section in glial tumors was 96.06%. However, in non glial lesions, the diagnostic accuracy was = 68.18%

Among 7 meningeal tumors, 3 were diagnosed accurately on frozen section (42.7%). 2 out of 3 metastatic carcinomas were diagnosed accurately in frozen section (66.67%). None of the two central neurocytomas were correctly diagnosed in frozen section.

Figure 1 a) b) c) Glial tumors – fibrillary pattern on crush, forzen and biopsy



a **b** **c**

Figure 2: Gemistocytic glioblastoma

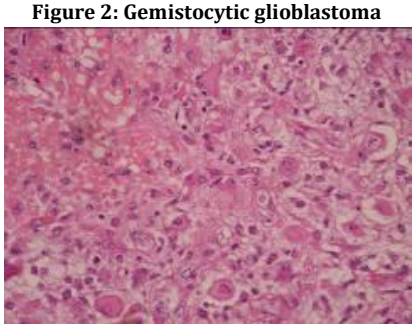
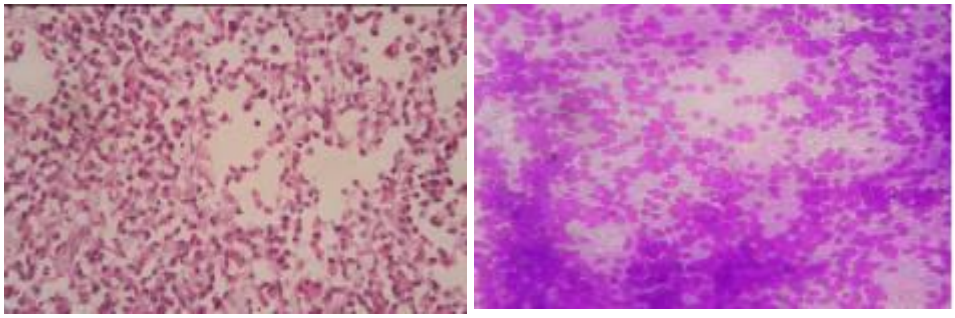
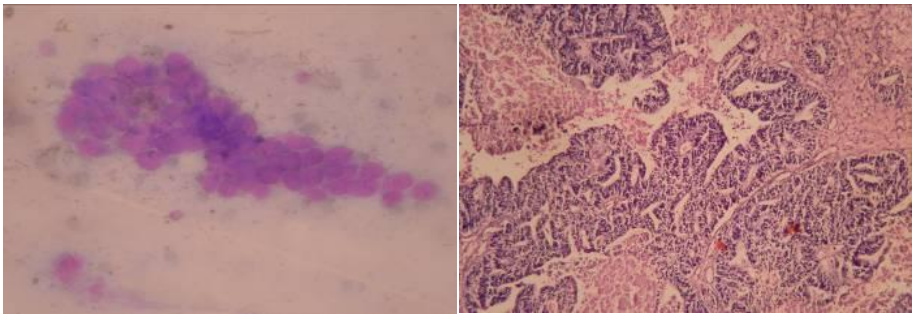


Figure 3 a) 3b): Pituitary macroadenoma



a **b**

Figure 4a) 4b) Metastatic carcinoma



a **b**

4. Conclusion

Our results indicate that while the crush cytology and frozen section are accurate in diagnosis and grading of glial tumors and metastatic carcinoma, the accuracy varies with non glial lesions and non neoplastic conditions.

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